







Underground Injection Control (UIC) Permitting July 28, 2021

The meeting will begin shortly.





















Underground Injection Control (UIC) PermittingJuly 28, 2021

Rob Castillo















Power Point Presentation



This presentation is available for download from the RRC website at https://www.rrc.texas.gov/oil-and-gas/workshops-and-conferences/rrc-regulatory-webinars-2021-schedule/

Session Overview



- UIC Online Manual
- Safe Drinking Water Act & Primacy
- Permit Application Details
 - Forms and Attachments
 - Administrative Review
 - Technical Review
 - Seismicity Review
- Application Decisions, Protests & Hearings



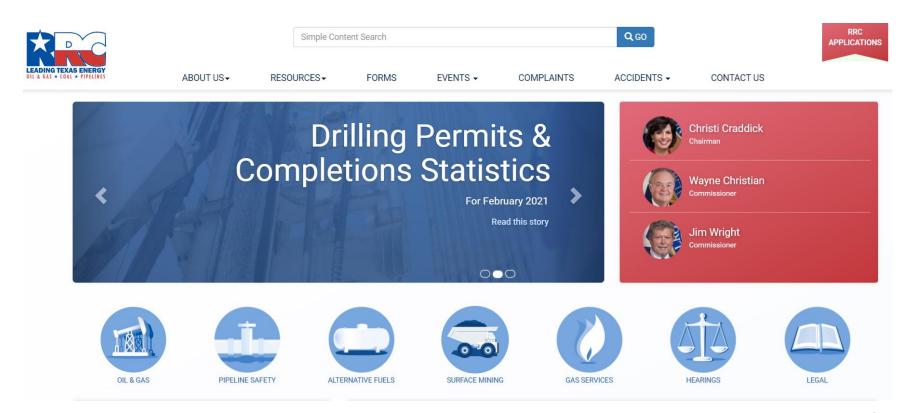
Where is it?

UIC ONLINE MANUAL

Webpage



Railroad Commission of Texas Webpage: http://www.rrc.texas.gov/



Injection/Disposal Manual



- 1. Summary of Standards and Procedures
- 2. Guidelines for Permit Amendments: Non-Productive Formations
- 3. Guidelines for Permit Amendments: Productive Formations
- 4. Examples of Rule 9 and Rule 46 GAU letters
- Notice Instructions for:
 - Rules 9 Disposal into Non-Productive Formations
 - Rules 46 Injection / Disposal into Productive Formations
 - Rules 95 Liquid Hydrocarbon Storage in Salt Formations
 - Rules 96 Gas Storage in Depleted Reservoirs
 - Rules 97 Gas Storage in Salt Formations
- 6. Fresh Water Questionnaire
- 7. Cement Criteria
- 8. Packer Setting Depths
- 9. Fracture Step-Rate Test Guidelines
- 10. Downhole Oil/Water Separators
- 11. Permitting Flowchart
- 12. Frequently Asked Questions



Where does RRC get their authority? What does RRC have authority over?

SAFE DRINKING WATER ACT & PRIMACY

Safe Drinking Water Act

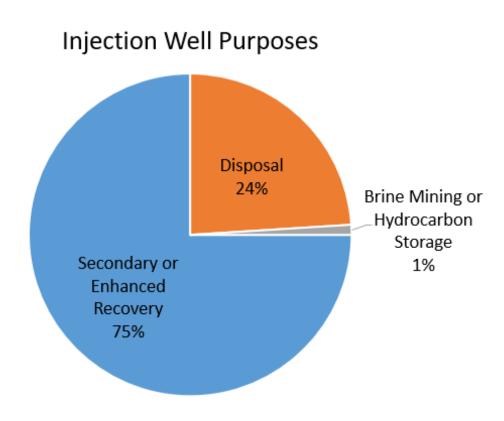


- Safe Drinking Water Act (SDWA) 1974
- To protect human health and drinking water
- Underground Injection Control (UIC)
 - Prohibits contamination of USDWs
- Underground Sources of Drinking Water (USDW)
- Enforcement Primacy
 - RRC: April 23, 1982
- There are 33,000 active injection wells in Texas!

Injection Well Classes & Jurisdiction



- Class I: industrial and municipal wastes
- Class II: oil and gas injection (75%), disposal (24%), storage
- Class III: solution mining (brine mining)
- Class IV: shallow injection (not used anymore)
- Class V: shallow injection, non-hazardous, remediation, pilot projects
- Class VI: CO₂ capture and storage





FORMS H-1/H-1A AND W-14

Which form do I file?



Form W-14:

 Disposal into a Non-Productive Formation -Statewide Rule 9

Form H-1 and H-1A:

- Injection/Disposal into a Productive Formation -Statewide Rule 46
- Multiple Zones: If a mix of Productive and Non-Productive
- Current or past production within 2 miles radius

E-mail to: <u>UIC Permits@rrc.texas.gov</u>

Permit Application Filing Fees



- Form W-14: **\$250** per wellbore
- Forms H-1 & H-1A: \$500 per wellbore
- Exception Requests: \$375 (additional) each request
- These fees include surcharges and are nonrefundable
- Check or Credit (Central Records)
- Applications will not begin processing until paid

H-1 – Operator & General Location



APPLICATION TO INJECT FLUID INTO A RESERVOIR PRODUCTIVE OF OIL OR GAS

1.Operator name (as shown on P-5, Organization Report)	_ 2. Operator P-5 No
3.Operator Address	
4. County	5. RRC District No
6. Field Name	7. Field No
8. Lease Name	9. Lease/Gas ID No

- Organization Information, Form P-5
 - Must have active P-5
 - Operator name, number and address
- General Location Information, Form P-4
 - Must have active P-4 (or be new drill)
 - Lease name and number
 - Field name and number

Determine the Field Name



H-1/H-1A Field Name:

- should be correlative to injection/disposal formation
- use deepest correlative formation if injecting into more than one formation or keep current Field Name if the well is already on proration schedule

W-14 Field Name:

 should be correlative to formation more than 2 miles away or correlative to the formation that is the source of disposal fluids

H-1 – Reservoir Data



- Geology
 - Formation Name, Lithology, Permeability, etc.

	RESERVOIR DATA FOR A	NEW PROJECT	
11. Name of Formation		_ 12. Lithology	
13. Type of Trap(anticline, fault trap, stratigraphic trap, etc.)		(e.g., dolomite, limestone, sand, etc.) 14. Type of Drive during Primary Production	
15. Average Pay Thickness	16. Lse/Unit Acreage	17. Current Bottom Hole Pressure (psig)	
18. Average Horizontal Permeability (n		ge Porosity (%)	

H-1 - Injection Project Data



- Purpose of Injection
- Waterflood, Disposal, etc.
- What will be injected
 - Salt Water, CO2, Natural Gas, RCRA-exempt Waste, etc.

			INJECTION	N PROJEC	T D	ATA				
20. No. of Injection Wells in	this application	r								
21. Type of Injection Project	t: Waterfloo	Waterflood ☐ Pressure Maintenance ☐		Miscible Displacement			□ Natural Gas Storage □			
	Steam		Thermal Reco	overy		Disposal			Other	
22. If disposal, are fluids fro	m leases other	than th	ne lease identi	fied in Iten	n 9?	Yes 🗆	No			
23. Is this application for a Commercial Disposal Well ?					Yes □	No				
24. If for commercial dispos	al, will non-haz	ardous	oil and gas w	aste other	than	produced water b	e disp	osed?	Yes □	No □
25. Type(s) of Injection Flui	d:									
Salt Water Brace	kish Water	Fres	h Water	CO₂ □	N ₂	☐ Air ☐ H	2S 🗆	LPG	NORM	
Natural Gas Poly	mer 🗆	Othe	er (explain) _							

H-1A – Injection Well Data



- Organization & Specific location
 - Operator, Field and Lease Name, etc.
 - Legal description & coordinates
- Well construction
 - Casing, tubing, packer description

INJECTION WELL DATA (attach to Form H-1) 1. Operator Name (as shown on P-5) Operator P-5 No. 3. Field Name 4. Field No. 5. Current Lease Name Lease/Gas ID No. (center of nearest town). 7. Lease is miles in a direction from 8. Well No. 9. API No. 10. UIC No. 11. Total Depth 12. Date Drilled 13. Base of Usable Quality Water 14. (a) Legal description of well location, including distance and direction from survey lines: (b) Latitude and Longitude of well location, if known (optional) 15. New Injection Well ☐ or Injection Well Amendment ☐ Reason for Amendment: Pressure Volume Interval Fluid Type I Other (explain) # Sacks of Top Determined by Casing Size Setting Depth Hole Size Casing Cement Top of Weight Class Cement Cement 16. Surface 17. Intermediate 18. Long string 19. Liner

H-1A – Injection Well Data - 2



- Injection Interval
- Injection Volumes and Pressures
- Total Vertical Depth (TVD) vs Measured Depth (MD)
 - Injection Interval, typically TVD
 - Packer Depth, typically MD
 - Perforation Depths, typically MD
 - Put both on the form for all these if deviated or horizontal!

20. Tubing size	21. Tubing depth	22. Injection tubing packer depth	23. Injection interval	to	
24. Cement Squeeze Operations (List all)		Squeeze Interval (ft)	No. of Sacks	Top of Cement (ft)	
25. Multiple Completion? Yes No		26. Downhole Water Separation? Yes No	NOTE: If the answer is "Yes" to Item 25 or 26, provide a Wellbore Sketch		
27. F	Fluid Type	28. Maximum daily injection volume for each fluid type (rate in bpd or mcf/d)	29. Estimated average daily injection volume for ear fluid type (rate in bpd or mcf/d)		
30. Maximum Su	rface Injection Pressure:	for Liquidpsig	for Gas	psig.	

H-1 – Certification Statement



- Sign & Date Certification Statement
 - Email address for quicker communication
 - Re-date so we can track the newest submission





ADMINISTRATIVE REVIEW

Admin Review at a Glance



- Fees are paid
- Form is complete
- Application includes all necessary attachments
- Data entry into tracking system

RRC Data Match



Check Organization Report (Form P-5):

- Check for current P-5 on file
- Check corporation franchise taxes are paid

Check Certificate of Compliance (Form P-4):

- Verify that applicant is the operator of requested lease
- For a new lease, file Form P-4 with completion report

Check UIC Well Inventory:

Is this application for a new or amended permit?

Notice of Application



Mail or deliver a copy of the application forms W-14 or H-1/H-1A, front and back, to the following parties:

- the surface owner of record (county deed)
- adjacent surface owners of record if application is for a commercial disposal well
- operators of active wells within a ½-mile radius of the proposed injection/disposal well
- county clerk
- city clerk if well is located within corporate city limits

Notice Documents (1 of 2)



- Labelled map showing the location of wells within ½-mile of proposed injection/disposal well
 - operators of wells must be notified unless
 the well is plugged and abandoned
- For a commercial disposal well, provide a plat showing the surface tract boundaries and all adjacent tract boundaries.

Notice Documents (2 of 2)



- List the names and addresses of:
 - surface owner(s), operators of wells within ½-mile radius, county clerk, city clerk, and adjoining surface owners if commercial
- Signed statement indicating the date that a copy of the application form(s), front and back, was mailed or delivered to everyone on the list.

Commercial Facilities

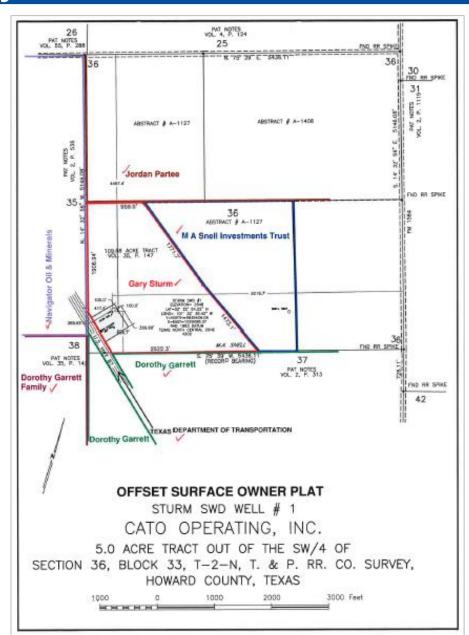


- Injection well is commercial if:
 - waste is partially or wholly trucked in and
 - a disposal fee or other compensation is chargedand
 - it is your primary business purpose

 Surface facility requirements: spill prevention and containment, restricted access, and additional financial security if you have pits

Adjacent Surface Owner Plat





Published Notice



- Publish notice for one day in a newspaper with general circulation in the county
- Submit newspaper clipping with notarized affidavit of publication
- Publication and affidavit format available on RRC website Injection Permitting Manual
- 15-day waiting period starts when UIC accepts application for filing.

Published Notice Text



- Match the application and the notice for:
 - direction and miles to center of nearest town
 - injection/disposal interval for several wells publish the shallowest top and deepest bottom
- State that the application is for commercial disposal, H2S or NORM injection if applicable
- Legal authority for permit, Instructions to protest, RRC contact information (format available on RRC website)



TECHNICAL REVIEW

GAU Letters & Geologic Isolation



- RRC Groundwater Advisory Unit (GAU) issues the Groundwater Protection Determination (GW-2)
- Form H-1/H-1A: Form GW-2 stating the depth to which UQW (Usable Quality Water) and USDW(Underground Source Drinking Water) must be protected
 - GW-1 Purpose of Filing must be H-1
- Form W-14: Submit GAU letter stating that the proposed injection will/will not endanger freshwater UQW and USDW.

Water Quality Terms & Uses

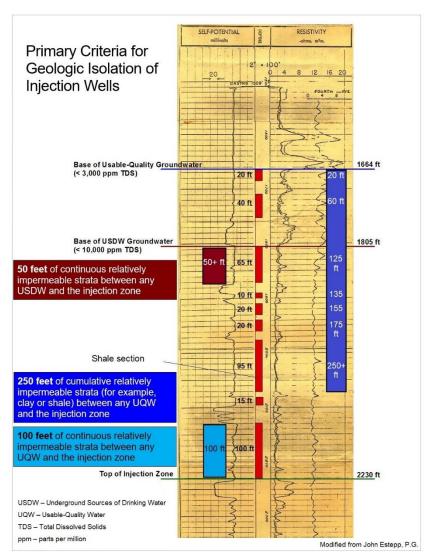


- USDW < 10,000 ppm Total Dissolved Solids (TDS)
 - SDWA protects, "freshwater" from SWR 9 & 46
- Usable-Quality Water < 3,000 ppm TDS
 - RRC standard for casing
- Superior Water ≤ 1,000 ppm TDS
 - RRC may recognize and require additional protection

Geologic Isolation



- 250 ft cumulative impermeable strata to BUQW.
 - 100 ft continuous
- 50 ft continuous impermeable strata to USDW



Aquifer Exemption



- Injection into groundwater less than 10,000 ppm TDS
- EPA website:
- i) https://www.epa.gov/uic/aquiferexemptions-map
- Fluid Source Limit
- Check our online manual

Electric Log



- Complete electric log with header that shows proposed zone and overlying strata
- If log is unavailable, submit a log from a nearby well (include plat showing both locations)
- If multiple wells are on Form H-1, only one well log is required if the log is representative of all wells
- Digital Well Log Submission RRC Online

Electric Log Annotations



- Annotations will help confirm protection of freshwater
- Top and Bottom of Injection Interval
- Tops of formations
- Bases of freshwater (USDW and UQW)
- Isolating strata from freshwater
 - shale, clay, anhydrite

Area of Review (AOR)



- Provide scaled map of wells within ¼-mile
- Table of wells within AOR with:
 - lease name and number
 - API and well numbers
 - total depth and date drilled
 - current status (producing, shut-in, P&A'd, etc)
 - plugged wells, include plug date and Form W-3
- Confirm that wells are on the proration schedule, have been properly plugged, or do not penetrate the injection zone

Create AOR Map – Public GIS Viewer



Public GIS Viewer



User Guide

GIS User Guide (PDF)

Training Videos

The following training videos provide step-by-step instruction for new features of the Public GIS Viewer. The videos will open in a separate window, allowing you to toggle between the video and viewer.

Note: These videos do not contain audio.

API# Or Address Search

Survey Search

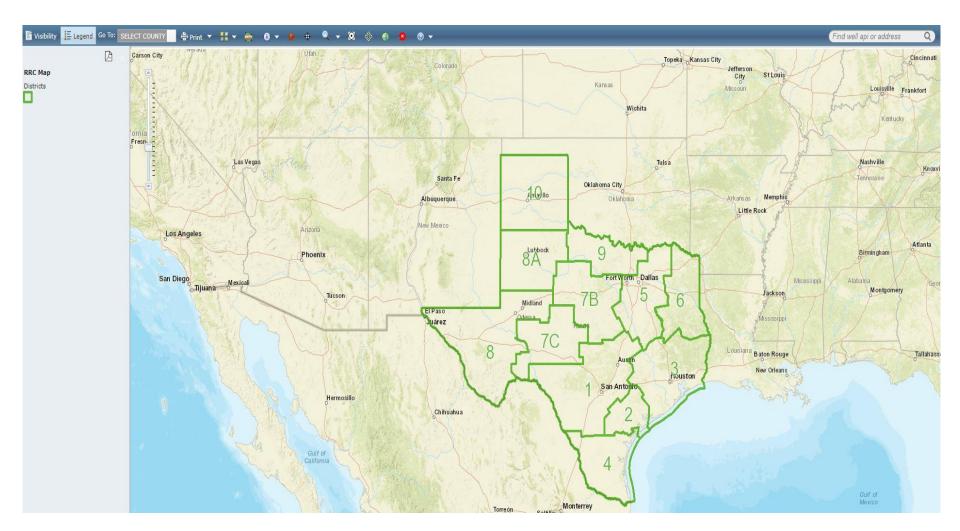
Locating Pipelines

Viewing Coordinates

LAUNCH PUBLIC GIS VIEWER

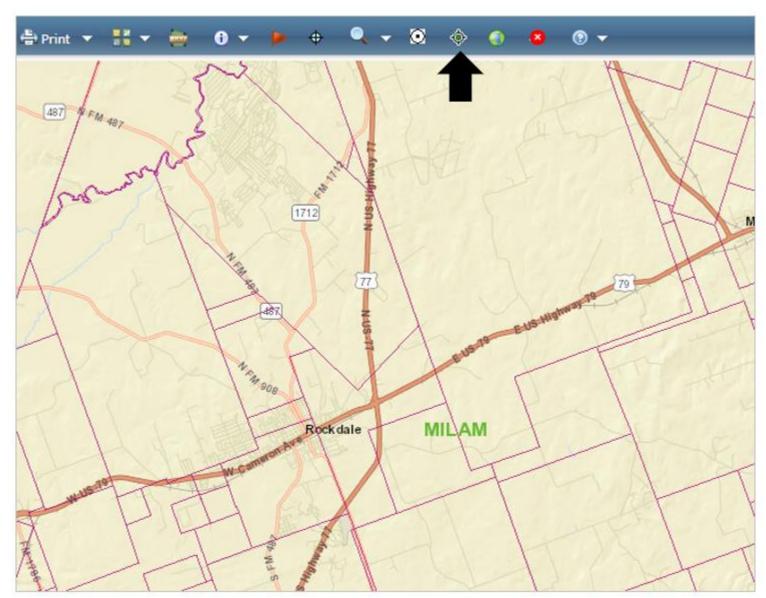
Create AOR Map (1 of 3)





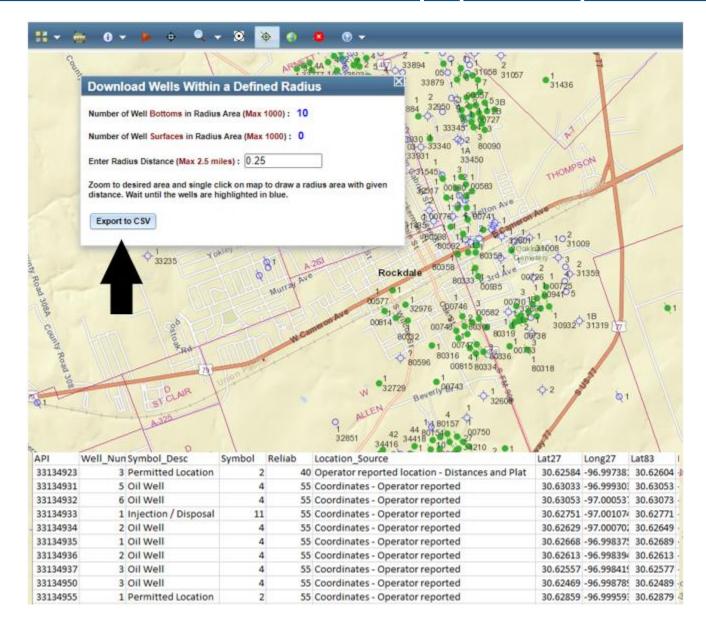
Create AOR Map (2 of 3)





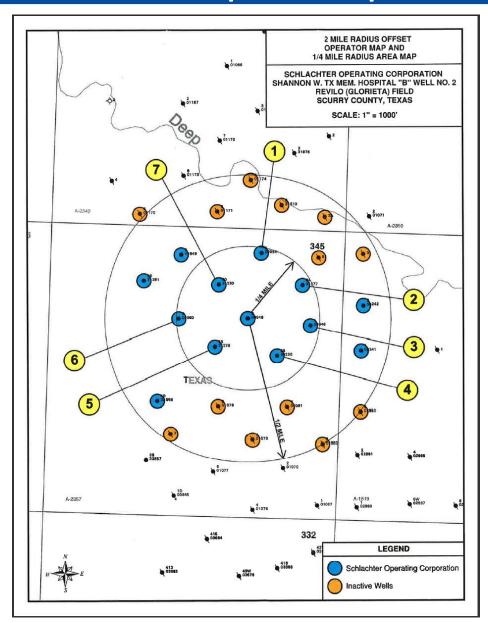
Create AOR Map (3 of 3)





AOR Map Example





AOR Well Listing Example



1/4 MILE RADIUS WELL TABULATION SCHLACHTER OPERATING CORPORATION SHANNON W. TX MEM. HOSPITAL "B" WELL NO. 2 REVILO (GLORIETA) FIELD SCURRY COUNTY, TEXAS

MAP#	OPERATOR NAME LEASE NAME & WELL #	API#	FIELD NAME	DATE DRILLED	TOTAL DEPTH	STATUS
1	Schlachter Operating Corporation Shannon W. TX Mem. Hospital "B" #5	415-00954	Revilo (Glorieta)	06/21/57	2878	On Schedule - Producing
2	Schlachter Operating Corporation Shannon W. TX Mem. Hospital "B" #34	415-31377	Revilo (Glorieta)	08/23/79	2914"	On Schedule - Producing
3	Schlachter Operating Corporation Shannon W, TX Mem. Hospital "B" #1	415-00946	Revilo (Glorieta)	04/13/57	2893	On Schedule - Producing
4	Schlachter Operating Corporation Shannon W. TX Mem. Hospital "B" #28	415-30296	Revilo (Glorieta)	04/09/74	2845	On Schedule - Producing
5	Schlachter Operating Corporation Shannon W. TX Mem. Hospital "B" #35	415-31376	Revilo (Glorieta)	08/29/79	2928	On Schedule - Producing
6	Schlachter Operating Corporation Shannon W, TX Mem. Hospital "B" #9	415-00960	Revilio (Glorieta)	07/18/57	2907	On Schedule - Producing
7	Schlachter Operating Corporation Shannon W. TX Mem. Hospital "B" #30	415-31330	Revilo (Glorieta)	04/12/79	2900'	On Schedule - Producing

Page 1

^{*} Plugging reports attached hereto for all wells which are currently plugged as shown above.

Unknown Status or Improperly Plugged



- You may plug the well or enter the well to determine status if unknown
- Applicant may use a Pressure Front Calculation (PFC) to show USDW will not be contaminated
- PFC must be prepared by a Texas-Registered Professional Engineer

Surface Casing



- Base of usable-quality water (BUQW) determined by GAU
- Commercial and new injection/disposal wells must set and cement surface casing through the BUQW
- Wells converted from production are reviewed on a case-by-case basis. If permitted, additional requirements like:
 - annual mechanical integrity (MIT) testing vs 5 years
 - weekly tubing-casing annulus monitoring (TCAM)

Production Casing



- Cement must be adequate to confine fluids to the injection zone
- 600 feet of cement above injection interval if Top Of Cement (TOC) is based on volume calculation.
- 250 feet if TOC is based on temperature survey
- 100 feet if TOC is based on cement bond log and
 - At least 80% bond
 - No indication of channeling

Packer Setting Depth



- Form W-14, Statewide Rule 9: set within 100 feet of the permitted zone
- H-1/H-1A Statewide Rule 46:
 - Have a minimum of 200ft of cement above packer and it must be at least 150 ft below the BUQW.
 - Should have cement behind casing and no permeable zones between the packer and the top of the injection interval to protect natural resources

Injection Pressure & Volume (1 of 2)



Rates of 25,000 bpd or higher, trigger a high-volume procedure review. Fracture gradients from step-rate tests MAY be required to justify higher pressures and volumes.

 For coastal wells less than 2,000 feet, injection above Barnett Shale, and injection into Delaware formations pressure may be limited to ¼ psi per foot.

Injection Pressure & Volume (2 of 2)



- Fluids must remain confined to permitted injection interval and formation(s). Therefore, fracturing the confining zones for the injection interval is prohibited.
- Fracture gradient data for confining zones may be required.

Injection Fluids



- Injection of Hydrogen Sulfide requires "well-specific" authority (SWR 36)
 - Must go through a public hearing
 - Admin approval from the District Office H2S Coordinator if already been through public hearing
- If freshwater is to be injected, you must submit the Fresh water questionnaire and the Form H-7 (unless fresh water is purchased)
 - Search for "questionnaire" in search box
 - plat of freshwater rights
 - chemical analysis of the fresh water

East Texas Review



- Shelby, Panola & Harrison County
- Over-pressurization Concern
- Review & Supplemental Data
 - i. ½ mile Top of Cement Table
 - ii. Annotated Log
 - iii. Porosity and Permeability data
 - iv. Historic H-10 data for surrounding injection/disposal wells
- Monitoring Conditions



SEISMICITY REVIEW

Seismic Activity Amendments



- Amendments to Rules 9 & 46 in 2014
 - RRC may modify, suspend or terminate a permit if disposal is likely to be contributing to seismic activity
 - Requires seismic information with disposal well applications
- Include a survey of seismic events from the USGS within 9.08 kilometers of the proposed well site

Disposal Well Seismicity Screening



- An earthquake event of 2.0 M or greater within the 9.08 km area of interest (AOI) will trigger the seismic review
- Deep disposal applications AOI at 25 km.
- RRC Staff will consider both USGS and TexNet catalogs in assessing the seismic trigger.

Seismic Catalogs



TexNet Catalog:

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(<a href="https://www.beg.utexas.edu/texnet-cisr/texnet/earthquake-catalog">https://www.beg.utexas.edu/texnet-cisr/texnet/earthquake-catalog</a>)
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 USGS Catalog: (http://earthquake.usgs.gov/earthquakes/search/)

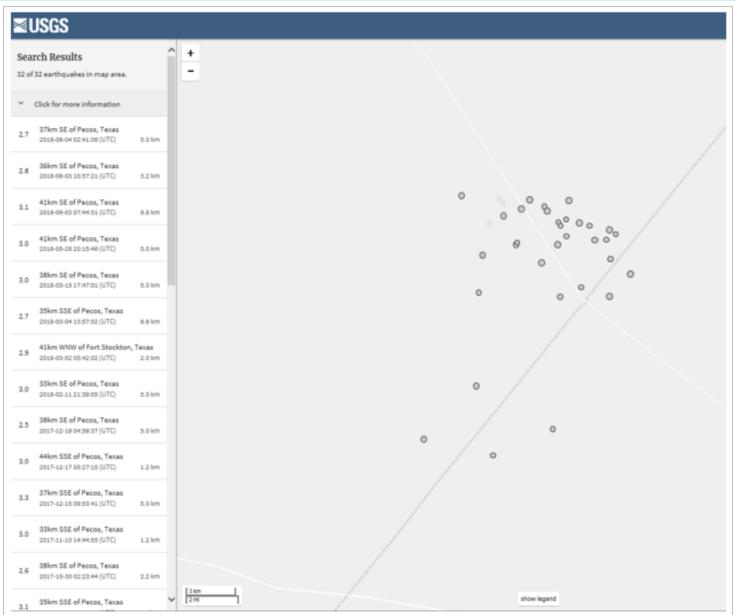
Seismic Event Survey



- USGS Earth Archive Search
- Enter the following parameters:
 - DATE & TIME: 1973-01-01 00:00:00
 - MAGNITUDE: Minimum: Enter 2
 - Advanced Options:
 - CIRCLE: Center Latitude and Center Longitude
 - CIRCLE: Outer Radius; Enter 9.08
- Include the map and the page depicting your inputs
- The map should display details about each event, including location, magnitude, and date

USGS Search - Results





Supplemental Info for Seismicity



- Structure map(s)
- Isopach map(s)
- Cross-sections
- Fault hazard analysis may be required

Permit Conditions



- Max daily injection volume limit
- Daily Records (volume, max pressure)
- Initial Static Bottom-hole Pressure Test
- Step Rate Test
- Seismologist review and approval with additional conditions as necessary

Seismic Monitoring



Disposal wells may be authorized to inject an additional 10,000 bpd, up to 30,000 bpd, provided:

- Operator actively implementing a seismic monitoring plan that augments the open public data network, and
- Operator develops and implements a seismic event response plan (submitted to RRC)

Seismic Monitoring Plan



- Implement a seismic monitoring plan that provides for the contribution of data to an existing public seismic network (e.g., TexNet).
- Monitoring to contribute to the body of public knowledge available to better resolve earthquake locations, especially depth.
- Include method of monitoring, type of instrumentation, reporting of data analysis, and an archive of the data in a public seismic database.



PERMIT AMENDMENTS, APPLICATION DECISIONS, PROTESTS & HEARINGS

Permit Amendments



- File Form W-14 or H-1/H-1A with filing fee
- Filing requirements vary with purpose of amendment
- Some amendments (like injection interval amendments) will require an entire application as if it were new (for example, well log, groundwater letter, AOR, notice, etc.)

Permit Amendment Guidelines



Statewide Rule 9

Filing Requirements	To Amend Injection Interval	To Amend Injection Pressure	To Amend Injection Volume	To Amend Fresh Water Volume	To Amend to Commercial	To Amend Injection Fluid Type (Other than H2S or NORM)	To Amend Injection Fluid Type (H2S or NORM)
Filing Fee + Surcharge: \$250 per well	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Application Form: (Form W-14)	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Electric Log	Yes, unless previously filed	No	No	No	No	No	No
GAU W-14 Review Letter	Yes, unless previously filed in the last 5 years	No	No	No	No	No	No
Area of Review: Map of Wells	Yes, if current permit issued before 4/1/82 or change is uphole	No	No	No	No	No	Yes
Area of Review: Table of Wells	Yes, if current permit issued before 4/1/82 or change is uphole	No	No	No	No	No	Yes
Step-Rate Test	No	Yes, If pressure > 0.5 psi/ft.	No	No	No	No	No
Ownership Survey Map to show wells/operator within one-half mile radius	Yes	Yes	Yes	Yes	Yes	Yes	Yes 6

Post Permitting



- Perform a Mechanical Integrity Test (MIT, Form H-5) before injection
 - File online only
- File completion report (Form W-2/G-1)
 - Filing online greatly reduces processing time
 - Lease numbers for new leases are assigned after final processing/approval of completion report
- File annual Form H-10 upon due date
 - You will receive a letter indicating when H-10 is due
 - Filing online greatly reduces processing time

Application vs Completion



- The well must be constructed and operated as proposed and permitted
- Significant changes will require permit amendment, or may result in enforcement or permit cancellation
- Permit-required remedial action must be done
 BEFORE injection begins

Permit Denied



- If application remains incomplete after two additional submittals, it is returned
- Applications will be administratively denied if lease is under severance or seal-in. (This does not apply to permit amendment applications that return well to compliance.)
- Unsatisfactory well completion or operating proposal
 - Modify the application to allow for administrative approval, or
 - Request a hearing

Protested Applications



- Staff may not administratively issue a permit if it has a valid protest
- Protests must be filed within 15 days of the date of notice, the date of publication or the date that the application is filed with UIC department, whichever is later
- Protests received after the 15-day window will not be considered. If the application was already protested validly, it may be possible to join the hearing once docketed

Withdraw or Hearing



Options for applicant:

- Withdraw the application
- Obtain a withdrawal letter from the protestant, or
- Go to Hearing:
 - The application must be administratively complete
 - Pre-hearing and/or hearing will be held
 - Protest is dismissed and remanded to UIC for administrative processing, or the Commission rules on the application

Team Leads



Sean Avitt	Manager	Sean.Avitt@rrc.texas.gov
Jason Lockie	Admin Permitting Team Lead	Jason.Lockie@rrc.texas.gov
Ric Rosso	Technical Permitting Manager	Ricardo.Rosso@rrc.texas.gov
Lauryn McFarland	Reporting & Monitoring Team Lead	Lauryn.McFarland@rrc.texas.gov

Questions?



Thanks!

Rob Castillo rob.castillo@rrc.texas.gov

Evaluation & Archive Video



Evaluation

 Please complete the evaluation available on the RRC website at https://survey.alchemer.com/s3/6403402/202
 1-RRC-Regulatory-Webinars-Oil-Gas-and-Pipeline-Safety-Evaluation

Archive Video

 A link to the archive video of the webcast will be available on the same webpage as the presentation.